

Rinnai ENERGYSAVER® Direct Vent Wall Furnace Product Knowledge Training

Course #201101



DV Product Knowledge #201101 –061311

Introducing the Rinnai Direct Vent ENERGYSAVER® Furnace



- Rinnai is excited to introduce the latest release of our ENERGYSAVER Wall Furnace
- Introduced to America in 1993, the Rinnai ENERGYSAVER is one of Rinnai's most proven and reliable products
- In keeping in tune with industry trends for simplicity and versatility, the latest products in the ENERGYSAVER family offer easy control and functionality while continuing Rinnai's commitment to provide cutting edge, efficient heating technology
- The table below shows the recent and future evolution of the ENERGYSAVER model nomenclature

2008 Model	2009 Model	2010 Model	2011 Model	2012 Model
RHFE-201RFA	ES08	EX08C		
RHFE-263RFA	ES11	EX11C		
RHFE-431RFA	ES17	EX17C		
RHFE-431RFTA	EX17			
RHFE-556RFA	ES22	EX22C		
RHFE-556RFTA	EX22			
RHFE-556RFTA-W	EX22W	EX22CW		
RHFE-1004RFA	ES38	ES38	ES38	EX38C
RHFE-1004RFA-W	ES38W	ES38W	ES38W	EX38CW



Product Model Numbers and Specifications

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NEW MODELS	PREVIOUS MODELS	CFM*	MAX POWER*	DECIBELS*	INPUT BTU RANGE*	AFUE (Efficiency)*
EX08C	ES08, RHFE 201 FA	55.5-82.0	41-42 W	27-36dB	3,000-8,000 NG/LP	NG-82% LP 83%
EX11C	ES11, RHFE 263 FAII	69.3-102.5	44-47 W	31-38dB	5,500-11,000 NG 5,700-11,000 LP	NG-81% LP-82%
EX17C	ES17, RHFE 431 FAIII EX17, RHFE 431 WTA	111.3-137.8	40-46 W	33-38dB	8,200-16,700 NG/LP	NG-81% LP-82%
EX22C	ES22, RHFE 556 FAIII EX22, RHFE 556 WTA	111.3-162.7	52 W	32-42dB	8,200-21,500NG 8,200-20,700 LP	NG-81% LP-82%
ES38	RHFE 1004 FA	203.4-360.6	121 W	37-47dBA	10,500-38,400 NG 10,500-36,500 LP	NG-80.6% LP-82%
Ensure the correct part number is identified for service / parts support *Current model specifications-previous models may slightly vary						



ES38



EX17C
EX22C



EX08C
EX11C

All models available in beige
EX22(C) and ES38 models are
also available in white.



Beige



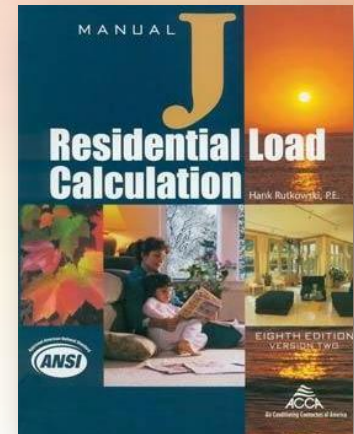
White

- When sized correctly, the ENERGYSAVER® Furnace can be used as a whole house/primary heat source
- Easy Control and Operation
 - One-touch ignition
 - Programmable thermostat with a temperature range between 55°F to 95°F (13°C to 35°C)
 - During normal operation, the display will dim to save power
 - Display available in Fahrenheit or Celsius
 - Setback and Frost Protection allows a minimum temperature to be maintained even when off or between scheduled heating events
 - Adjustable maximum temperature setting
 - Energy saving economy setting
- The unit's standby power consumption is less than 1 Watt
- Seven-stage Intelligent Modulating Gas Valve and Blower control
- Warm air discharge at floor level
 - Directional louvers to optimize direction of air flow
- Ultra-quiet operation-Decibel range of 27-47 is comparable to a normal conversation
- Gas type is field convertible
- Restart Functions allow automatic restart after ignition, combustion, or power failures
- Small 3" diameter concentric vent

- Self Diagnostic Circuitry-Should the ENERGYSAVER® detect an unsafe operating condition, the unit will shut down and a fault code will display indicating the specific issue.
 - If the code is due to an ignition or combustion failure, the unit will attempt to relight automatically
- Function/Child Lock
- Cool to the touch Cabinets
- Restricted air filter indication lamp and audible reminder-Current model ENERGYSAVERS will flash a reminder lamp and emit an audible beep if it detects operational conditions indicative of a restricted air filter.
- Sealed Heat Exchanger-flame and combustion is sealed from the heating area
- Overheat protection- Multiple temperature sensors monitor the appliance's temperature. Shut down occurs if an unsafe operational temperature is detected.
- Combustion and convection fan validation-should either of these fans fail to maintain the proper speed (likely due to a restriction), the PCB will not allow the unit to operate
- Electronic ignition-no standing pilot
- Power failure protection-Should the ENERGYSAVER lose power, the gas supply will automatically close. Upon resumption of power, the unit will automatically attempt to restart
 - ENERGYSAVERS are equipped with an inline glass fuse and surge protection to protect from over-current or power surge

To ensure the ENERGYSAVER operates as designed, an industry standard Btu heat loss calculation must be performed on the area to be heated

- This calculation considers all factors that contribute to heat loss such as:
 - Area and volume of the space to be heated
 - Geographical location and climate where the furnace will be located
 - Structural characteristics of the building such as number of windows, exterior doors, construction material, etc
- The Air Conditioning Contractors' Association (ACCA) has an industry standard Btu calculation in their "Manual J" publication
- A qualified and licensed installer should be familiar with this type of calculation
- Visit <http://www.acca.org/> for more information
- Rinnai also offers a basic DV sizing calculator at http://www.rinnai.us/heat_selector_2007.swf
- NOTE: Incorrectly sized applications can lead to the ENERGYSAVER short-cycling or failing to bring the area to the desired set point temperature



ENERGYSAVER®—Whole House Furnaces

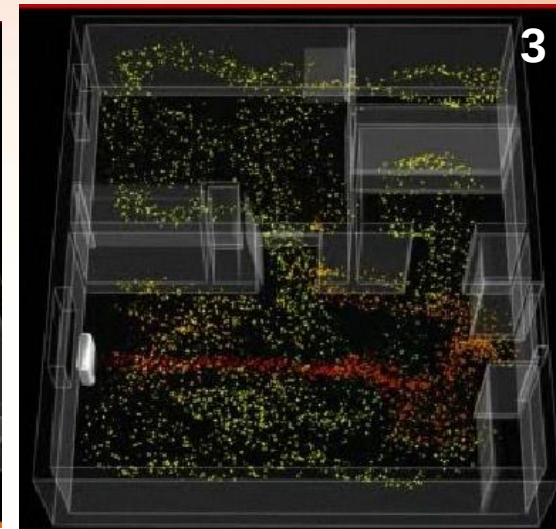
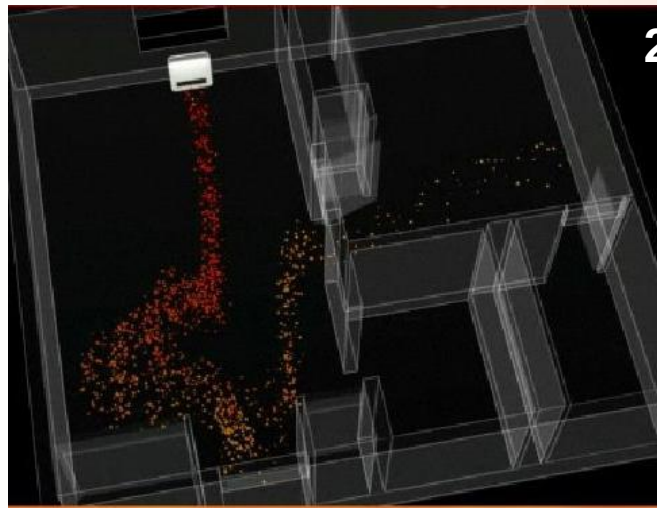
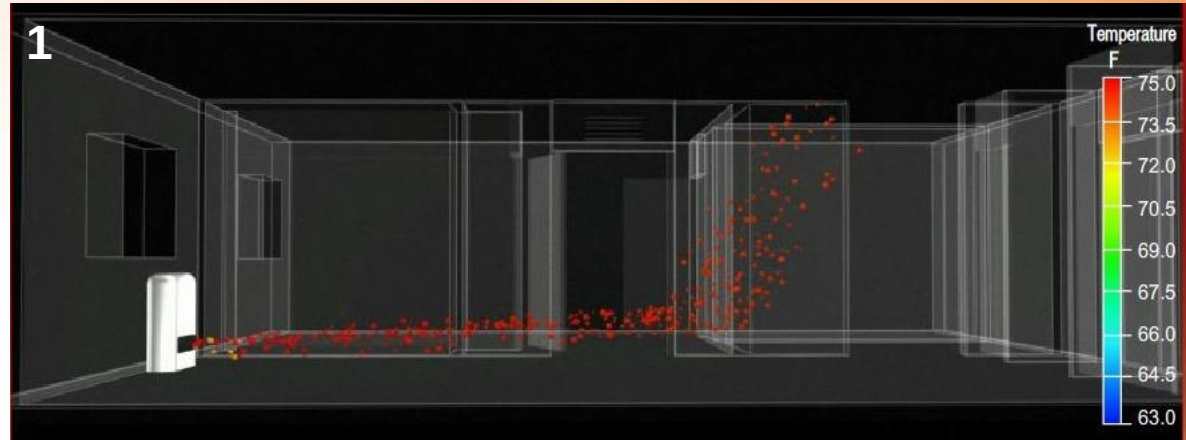
Key concepts

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The **ENERGYSAVER** has the ability to heat an entire structure from a central room. Here's how:

- 2nd law of thermodynamics – Heat seeks cold

- Once the main room approaches the set point temperature, the heat begins to move to other rooms—seeking cold
- The variable gas valve and blower control modulate to ensure heat reaches the remainder of the structure without overheating the main area
- Cold air is detected quickly by the thermistor—mounted two inches above the floor and able to detect changes as small as 6/10th's of a degree (Fahrenheit)
- These features aid in reducing stratification in the atmosphere (different layers of room temperature)



[\(Click here to watch animation\)](#)

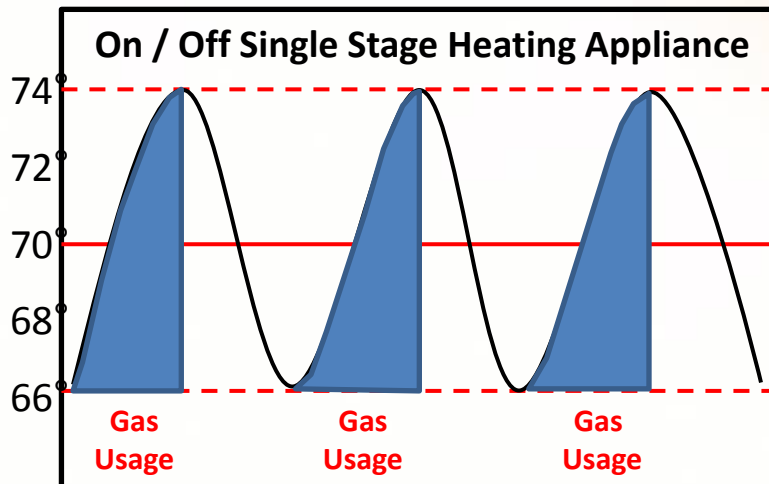
ENERGYSAVER®—Whole House Furnaces

Key concepts

Rinnai

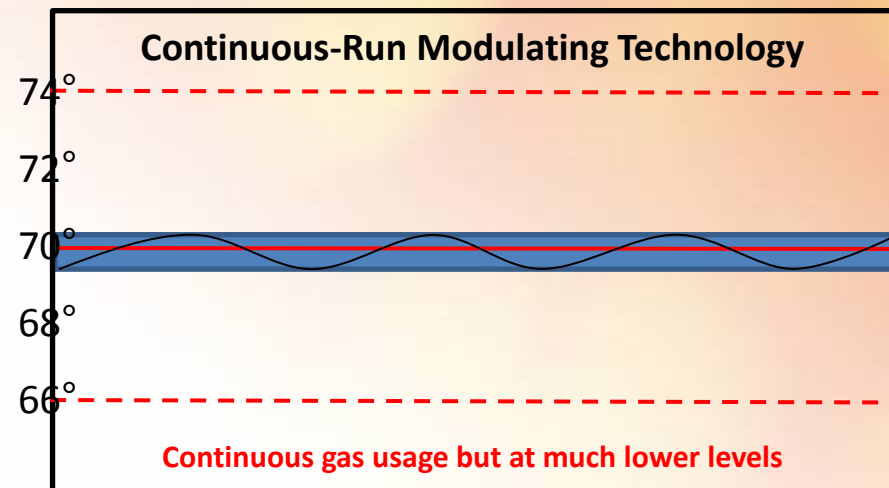
- Variable speed technology – Modulating gas and air based on the heat loss at that moment

- With on/off single stage operation, gas usage can be high due to alternating periods between maximum flame and no flame at all



- This results in different layers of temperatures throughout the structure leading to a less than comfortable living environment

- The Energysaver's modulating technology has the ability to replace only the heat escaping the structure by continuously operating at heating levels based on the demand at that moment



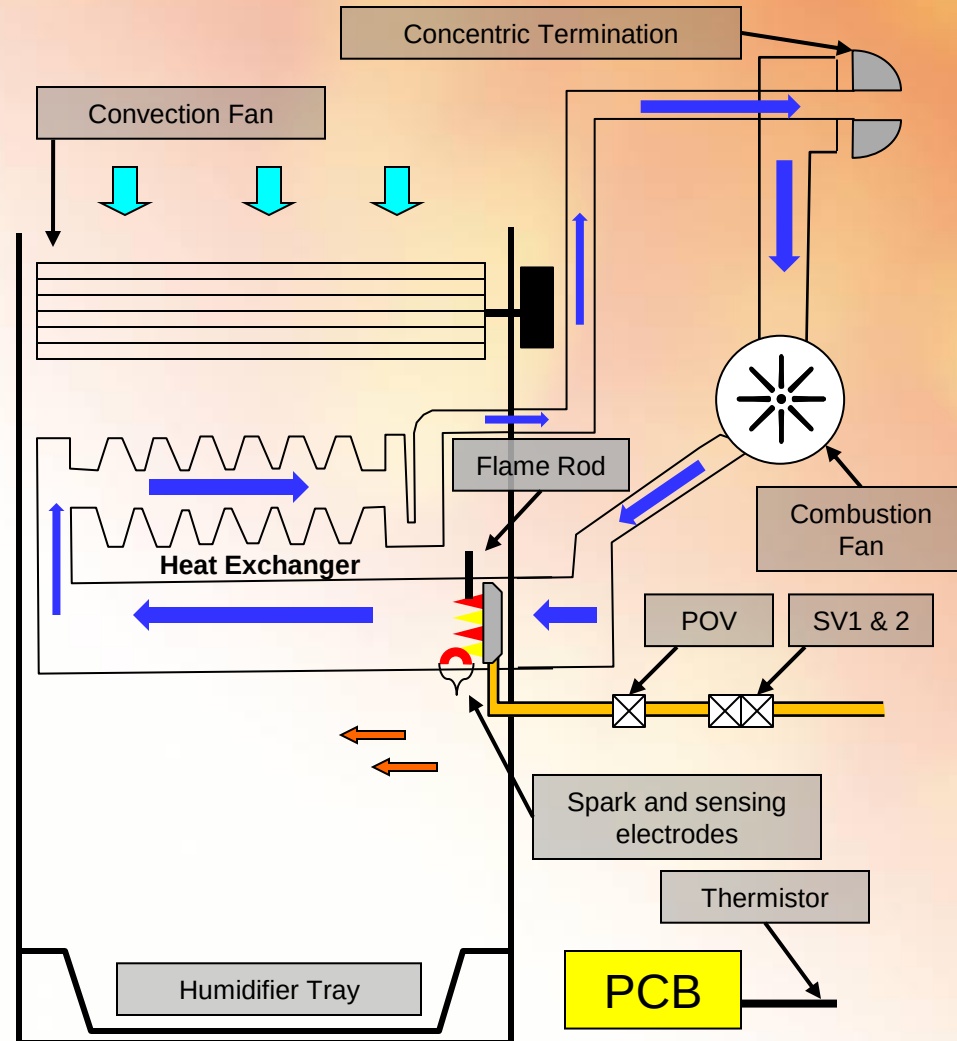
- This leads to lower gas usage and higher levels of comfort.

ENERGYSAVER® Direct Vent Furnaces

Operation Sequence

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1. Combustion fan purges heat chamber, PCB verifies fan rotation
2. Ignition spark begins
3. When sensing electrode detects spark, gas valve assembly opens
4. Ignition occurs and heat exchanger warms
5. Spark stops as flame rod & PCB verify flame
6. When heat exchanger is warm enough, convection room blower circulates warm air into the structure.
7. When filled, the humidifier tray ensures the air is not too dry (if needed)
8. Thermistor & PCB determine gas and fan settings
9. When temperature set point is reached, if needed, gas valves close & combustion fan stops. Convection fan continues to run to cool down unit.
10. When temperature drops, process starts over



Control Panel Review (C-Series models)

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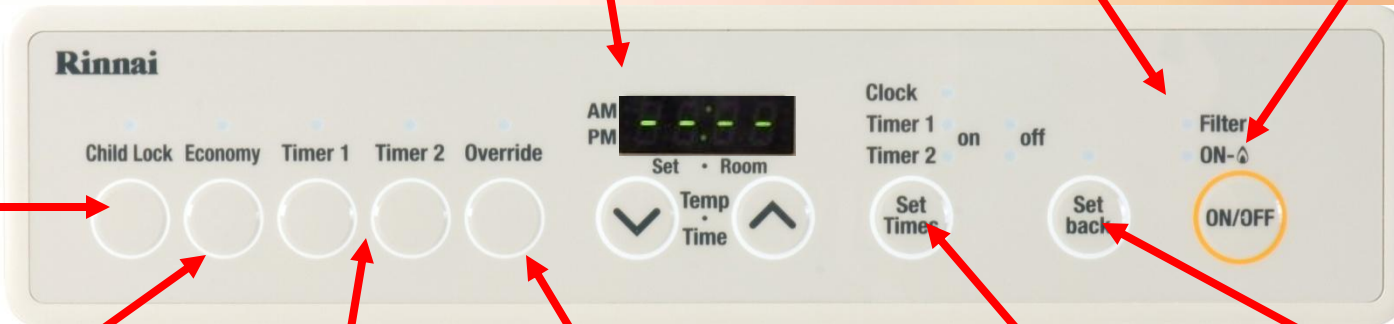
**EX08C, 11C,
17C, 22C
MODELS**

Temperature Control and Display-
Display will enter a power saving dimmer mode
during normal operation

Restricted
Filter
Indicator

Operation Lamp
Green = standby
Solid red = when flame is present
Flashing red = fault code is present

Child
Safety
Lock



Economy
Feature

Timer 1 and 2
Note: While off, pressing Timer
1 and 2 together will change the
display from F° to C°

Override
Temporarily bypasses timers

Timer and Clock
Setup

Setback
Feature

ES38 MODELS

Economy Feature

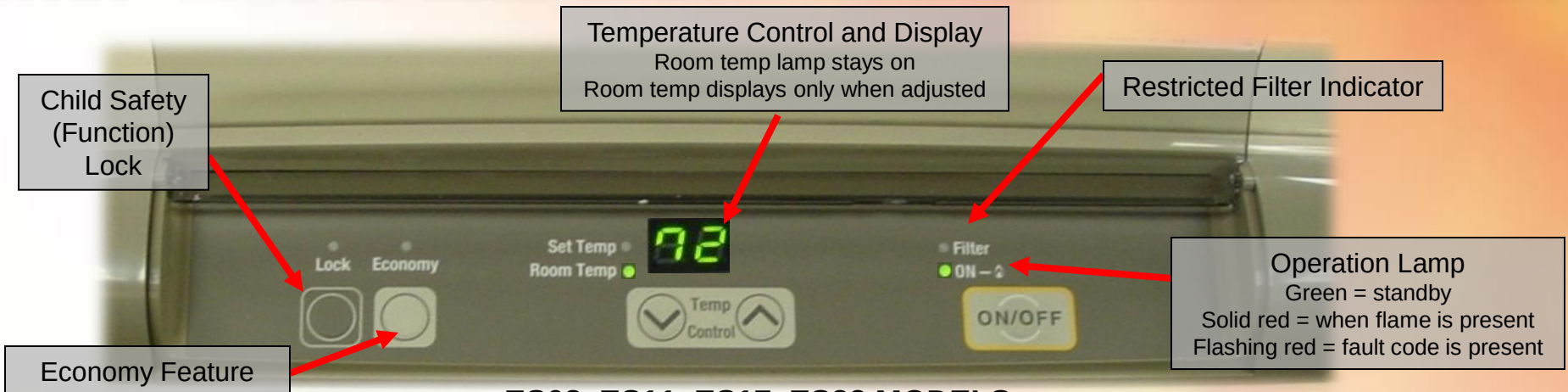


Temperature Control and Display
Room temp lamp stays on
Room temp displays only when adjusted

Function Lock -
Pressing both arrows will engage

Control Panel Review (all other current models)

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ES08, ES11, ES17, ES22 MODELS

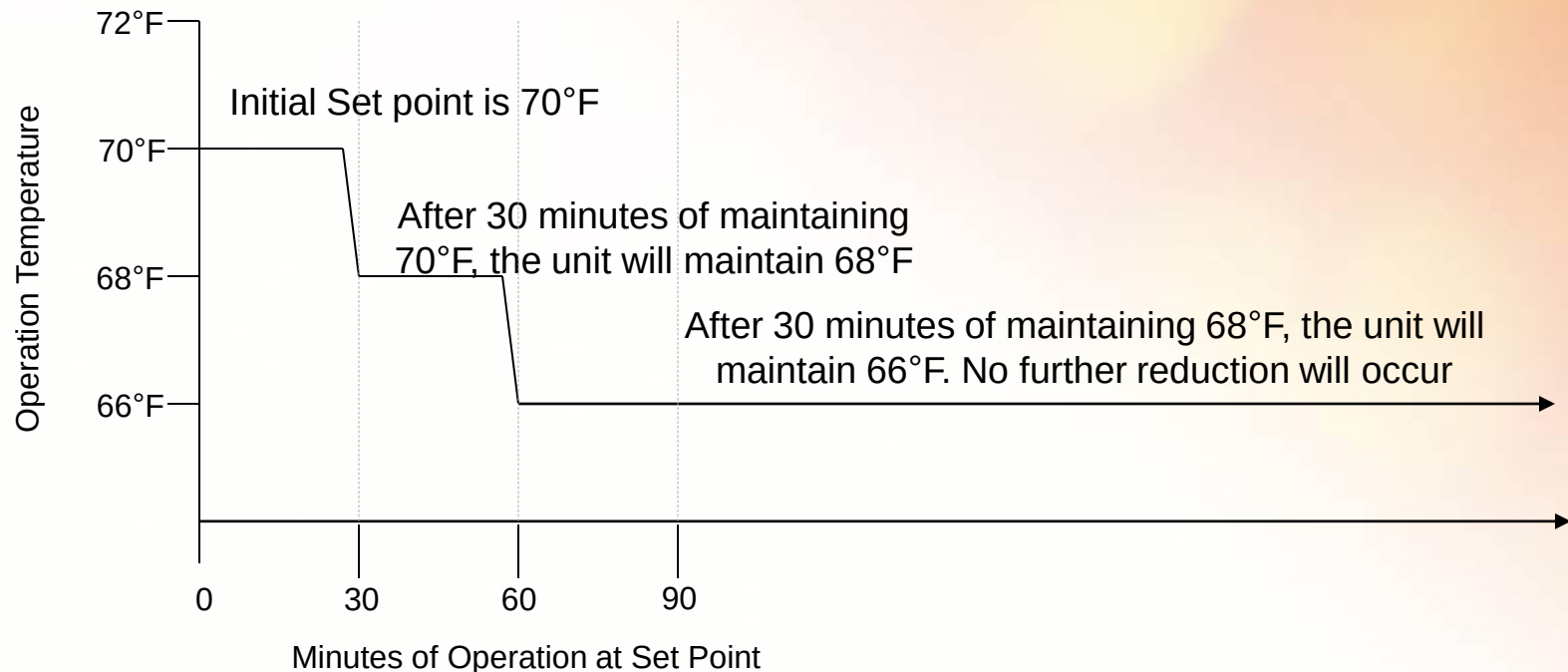


EX17, EX22 MODELS

Temperature Range of all Controls	Fahrenheit	L (approx. 55)	60	62	64	66	68	70	72	74	76	78	80	H (approx. 95)
	Celsius	L (approx. 13)	16	17	18	19	20	21	22	23	24	25	26	H (approx. 35)

Economy Mode is designed to save gas usage over time.

- The Economy Function is based on the theory that the human body cannot detect small temperature changes over an extended period of time
- 30 minutes after the set point temperature is achieved, the unit will reduce the temperature by 2°F. After 30 additional minutes, the unit will reduce the temperature an additional 2°F.
- The maximum temperature reduction will not exceed 4°F
- This reduction will not occur if the unit is undersized and cannot maintain the initial set point



Clock, Timer, and Setback Functions (C-Series)



C-Series ENERGYSAVERS® have two primary methods of operation

- Exclusively as a thermostatically controlled furnace
 - When left to operate on a continuous-run basis using feedback from its thermostat, the ENERGYSAVER will achieve an optimum balance between comfort and efficiency
- As a programmable furnace with two separate timers and a setback function
 - The timers allow two separate heating events to be set
 - Timer 1 and Timer 2 (individually or both as needed) can then be engaged to allow the unit to turn on and off for those events
 - The ENERGYSAVER is designed to attempt to have the area at the set point temperature when the timer event begins—meaning it could turn on several minutes earlier to achieve set point temperature
 - To set the clock and timers, see the installation manual
- If needed, the Override button can be selected to temporarily turn on or off the timers to allow manual operation
 - If the unit is operating during a Timer's event, pressing Override will turn the unit off until the next Timer's event
 - If the unit is off between Timer events, pressing Override will turn it on. It will continue to run until the end of the next Timer's event and return to Timer operation.
 - If Override is turned off, the unit will return to Timer operation



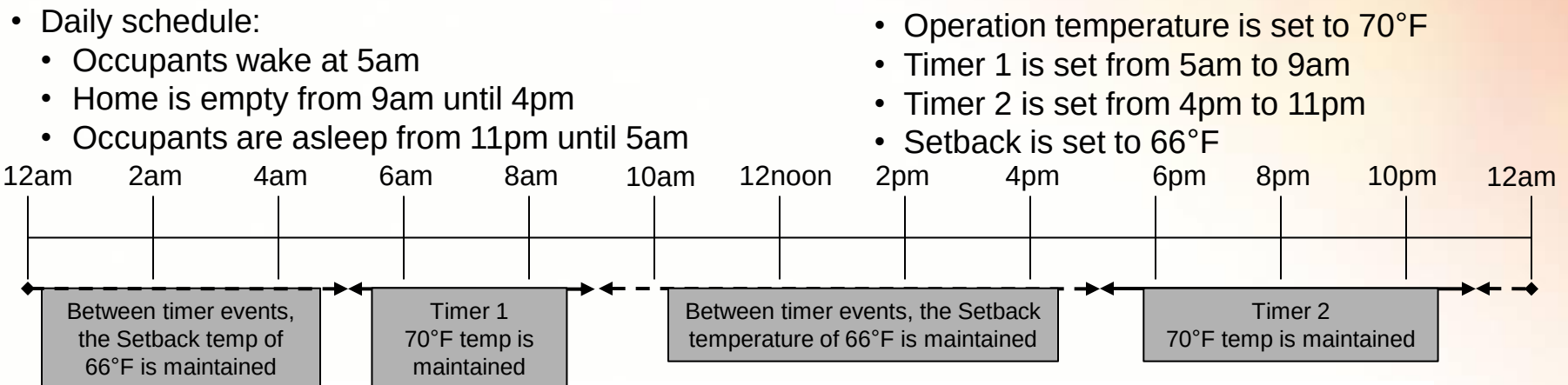
Clock, Timer, and Setback Functions (C-Series)



Setback allows a minimum temperature to be pre-set and maintained between timer events or while the unit is turned off

- This feature's primary function is to slightly reduce the temperature (and gas usage) during extended periods of nonuse or inactivity—such as sleeping or when the home is empty
 - NOTE: When this feature is used as a setback function for energy savings, it is not advisable to reduce setback more than 4-6°F from the regular set point. This could cause the ENERGYSAVER® to use more gas to return to the set point and cancel any savings achieved
- This feature can also be used as frost protection during longer periods of vacancy (such as in a second home). For this use the setback temperature can be set as low as 38°F
 - Even when off, if the setback feature is engaged, the setback temperature will be maintained
 - If power is lost and setback is ON, it will be ON at the resumption of power

The following example shows how, when used together, the timer and setback functions can maximize comfort and efficiency



All ES, EX, and C-Series models will attempt restart after a power failure or flame failure to ensure heating is not interrupted for extended periods of time

- If there is a power failure while the appliance is operating, the unit will attempt to restart automatically when the power is restored
 - The timers will retain their settings after a power outage
 - After an outage, the clock will retain the time at that moment until power resumes. Therefore, a short power outage (a few minutes) will have virtually no effect on timer operations whereas a longer outage will require the clock to be reset. Dashes will initially display to indicate an outage occurred.
- Should a high gust of wind, gas outage, etc. occur that affects the flame characteristic, the unit will automatically shut down, purge the combustion chamber, and re-ignite
 - If the unit cannot ignite or maintain flame for 15 seconds after ignition, code 11 will flash and the unit will try to ignite again in one hour
 - This code will not be stored in the fault code history
 - If at some point after 15 seconds of established flame the flame fails, the unit will immediately attempt to relight with no code flashing
 - If the unit cannot relight after this flame failure, code 11 will flash and the unit will try to ignite again in one hour
 - If the unit continually or intermittently fails to ignite, a qualified service technician may be needed to determine the cause
- Each manual has a section named “Restart Function” that explains this procedure
- Flame failure fault codes (code 12’s) are no longer needed due to this enhancement

Fault Codes



- A fault code will flash on the unit when a fault occurs. The unit will stop operating.
- Operation intervention is required for all codes EXCEPT a code 11.
- To view the last nine fault codes, with the unit OFF, press the UP, DOWN, and, ECONOMY buttons simultaneously

CODE	PROBABLE CAUSE	COMMENTS
11	Ignition or Flame failure	Flame current inadequate; Unit will attempt to relight (see Manual-Restart Feature)
14	Overheat Safety Device	Overheat safety bimetal(s) or thermal fuse has activated
16	Over temperature cut off	Room temperature is sensed as being above 104°F for longer than 10 minutes
31	Room temperature thermistor disconnection	Room temperature thermistor open circuit
32	Room temperature thermistor short circuit	Room temperature thermistor wire shorted or touching bare metal
33	High limit thermistor disconnection	High limit thermistor open circuit
34	High limit thermistor short circuit	High limit thermistor shorted or touching bare metal
49	Pressure sensor disconnect or breakdown	Check sensor connection to PCB & hoses to blower motor
53	Abnormal spark sensed	Spark not sensed correctly
61	Abnormal combustion fan motor rpm	Fan speed not achieved within time or goes over speed
62	Convection fan failure	Ensure convection fan can turn freely
70	ON/OFF switch failure	ON/OFF switch connects continuously for more than 15 seconds
71	Solenoid valve check	Solenoid valve(s) (SV1 & SV2) signal and response signal are different
72	Flame rod failure	PCB fails to sense microamps within 20 seconds
73	Communication failure	Data transfer within PCB fails
99	Flue block or venting disconnect	Check intake and exhaust inside and outside for blockage or freezing

- Warranty

Rinnai ENERGYSAVER® Furnace Warranty		
Heat Exchanger Coverage	Parts	Reasonable Labor
10 years	5 years	2 years
Refer to each model's installation and owner manual for full warranty details		

- Maintenance and Service

- The appliance should be inspected at least annually by a qualified service technician—see the installation manual for full details
- The exterior can be cleaned with a damp, warm cloth
- Ensure the vent termination is kept free of snow, ice, or any other obstructions
- Ensure the filter(s) are kept clean to ensure proper operation
 - If the filter(s) become blocked, the filter indicator light will illuminate and the unit will beep every five minutes. If ignored, the unit will eventually cease operation and display a fault code 14
 - Ensure the unit is OFF while the filter is removed—this will also allow the filter lamp and beep to reset



Rinnai America's phone support structure consists of the following departments:

- **CRC – Consumer Response Center – Fielding general calls, consumer questions, etc.**
 - Available in office from 8 a.m. to 8 p.m. EST, Monday - Friday
- **Parts and Warranty Department – Fielding parts orders and warranty issues**
 - Available in office from 8 a.m. to 5 p.m. EST, Monday – Friday
- **Technical Support Department– Fielding technical issues related to the function of all Rinnai Products**
 - Available in office from 8 a.m. to 8 p.m. EST, Monday – Friday AND **24/7/365** on call support for technicians who are at the service location.
- **Engineering / Applications Department – Fielding issues related to product applications including sizing**
 - Available in office from 8 a.m. to 5 p.m. EST (The engineering dept does not size heating appliance applications—an industry accepted Btu heat loss calculation must be performed by the installer)

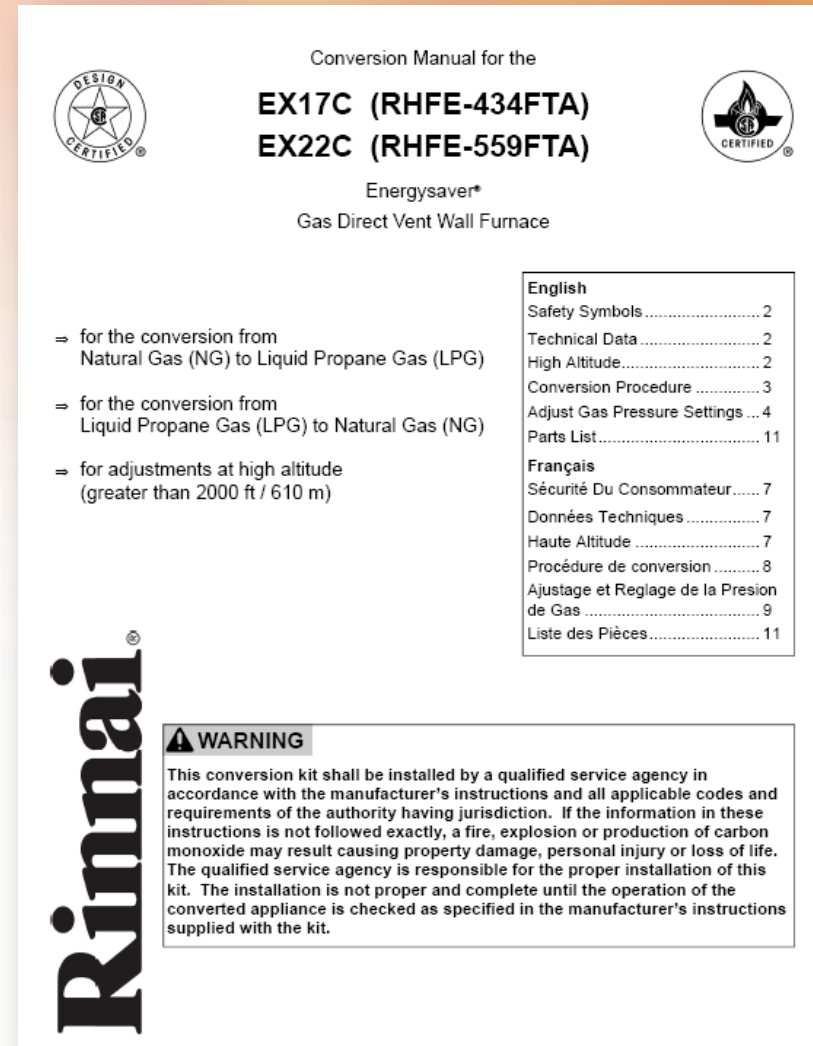
Rinnai America also provides the following web sites for support:

www.rinnai.us – our main site for all product, sales, and service information. Of Note—a comprehensive documents library is available at the sales/service link. Website registration is required for access.

High Altitude and Gas Conversion

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- All units are approved up to 10,200 feet
- The Installation manual and the conversion manual supplied with each unit has instructions for high altitude settings.
- High altitude conversion does not require additional or replacement parts—only a simple manifold gas pressure adjustment
- Only a dual port manometer will be required to complete this adjustment
- All EvergySaver® furnaces can be field converted from NG to LP or LP to NG
- Depending on model and year of manufacture, a conversion kit may be included with the product. If not, contact Rinnai for information on acquiring the proper kit (1-800-621-9419)



Maximum Temperature Limit



- All ENERGYSAVER® models now have the ability to set a maximum temperature limit directly from the control panel. This procedure is NOT in the manuals to allow property owners and managers to control this setting as needed.
- This is beneficial to landlords and property management to conserve energy and reduce unnecessary gas consumption
- To perform this adjustment :

Procedure for Setting Maximum Temperature Limit for ENERGYSAVER Furnaces					
ES08, ES11	EX08C, EX11C	ES17, ES22	EX17C, EX22C	EX17, EX22 (WTA Models)	ES38
1. While the unit is off, press the “Function Lock” or “Child Lock” and “Up” arrow buttons at the same time for about 3 seconds until the unit beeps				1. While the unit is off, press the “Economy” and “Select” buttons at the same time for about 3 seconds until the unit beeps	1. While the unit is off, press the “Economy” and “Up” buttons at the same time for about 3 seconds until the unit beeps
2. Select the maximum temperature with the up and down arrows					
3. Press the On/Off button to save the new setting					

PLEASE CONTACT TECHNICAL
SUPPORT FOR ANY QUESTIONS OR
ISSUES.